Claims

1. An adsorbing material comprising at least one porous functional solid incorporated in a polymer matrix, said adsorbing material containing the porous functional solid in an amount of 45 to 80 wt.% relative to the weight of the finished and activated adsorbing material, and said polymer matrix comprising at least one organic polymer, and having a secondary pore volume in addition to the primary pore volume of the porous functional solid.

2. An adsorbing material according to claim 1, wherein the amount of the organic polymer is 20 to 55 wt.% relative to the weight of the finished and activated adsorbing material.

3. An adsorbing material according to claim 1 or 2, wherein the porous functional solid is an adsorbing agent.

4. An adsorbing material according to claim 3, wherein the adsorbing agent is selected from zeolites of the groups 1, 2, 3, 4, 5, 6 and 7, compositions with structures iso-type, respectively, iso-morphous to the aforementioned types of zeolites, silica gels, silica-cogels and any combination thereof.

5. An adsorbing material according to claim 4, wherein the zeolites of the groups 1, 2, 3, 4, 5, 6 and 7 are selected from the members of the zeolite families A, X and Y.

6. An adsorbing material according to any of claims 1 to 5, wherein the decomposition temperature of the organic polymer is 180 to 450°C, preferably 230 to 400°C and more preferably 250 to 380°C, provided that the organic polymer is subjected to heat treatment at said decomposition temperatures for a duration of at least 1h.

7. An adsorbing material according to any of claims 1 to 6, wherein the melting temperature of the organic polymer is 100 to 390°C, preferably 180 to 300°C and more preferably 220 to 270°C.

8. An adsorbing material according to any of claim 1 to 7, wherein the organic polymer is selected from thermoplastics.

9. An adsorbing material according to claim 8, wherein the thermoplastics are selected from a polyamide, polyether sulphone, polyolefin, polyamide imide, polyethylene terephthalate and any combination thereof.

10. An adsorbing material according to claim 9, wherein the polyamide is a polyamide 66, polyamide 66/6, polyamide 46 or any combination thereof.

11. A shaped article comprising or consisting of an adsorbing material as defined in any of claims 1 to 10.

12. A shaped article according to claim 11 having a water adsorption capacity as measured at 80% relative humidity and at 25°C of at least 18 wt.% (relative to the weight of the finished and activated shaped article).

13. A shaped article according to claim 11 or 12 having a compressive strength of 150 N/mm^2 or higher, preferably 80 N/mm^2 or higher and more preferably 50 N/mm^2 or higher as measured by tensile/compressive testing machine model 1455 from Zwick with a 20 kN gauge from Zwick and a piston displacement rate of 1mm/min.

14. A shaped article according to one of claims 11 to 13 having a honeycombed geometry.

15. A method for preparing a shaped article as defined in any of claims 11 to 14, said method comprising the steps of:

a) forming a compound comprising at least one porous functional solid, at least one organic polymer and at least one removable rheological additive;

b) shaping said compound into a green body;

c) substantially or at least partially removing said rheological additive from the green body; and

d) optionally activating the green body obtained from step c) at a temperature of at least 90 °C.

16. A method according to claim 15, wherein the compound of step a) comprises 40 to 70 wt.% of porous functional solid, 20 to 50 wt.% of organic polymer and 0.5 to 25 wt.% of removable rheological additive, in each case relative to the weight of the total compound.

17. A method according to claim 15 or 16, wherein the removable rheological additive has an evaporation and/or decomposition temperature of 140°C to 300°C, preferably from 160°C to 240°C and more preferably from 180°C to 220°C, provided that the removable rheological additive is subjected to heat treatment at said evaporation and/or decomposition temperatures for a duration of at least 1h.

18. A method according to any of claims 15 to 17, wherein the removable rheological additive is selected from waxy components and/or oils.

19. A method according to claim 18, wherein the waxy component is selected from natural waxes, semi-synthetic waxes, synthetic waxes, modified, oxidized or microcrystalline forms of the aforementioned waxes and any combination of these.

20. A method according to claim 18 or 19, wherein the waxy component is a synthetic wax, preferably a polyolefin wax, ethylene-vinyl acetate copolymer, ethylene-vinyl alcohol, polyolefin glycol, amide wax or any combination of these.

21. A method according to any of claims 15 to 20, wherein steps a) and b) are carried out continuously.

22. A method according to any of claims 15 to 21, wherein in step b) shaping of said compound into said green body is performed by extrusion or injection molding.

23. A method according to any one of claims 15 to 22, wherein in step c) the rheological additive is removed by heat treatment, extraction, particularly solvent extraction, and any combination of these.

24. A method according to claim 23, wherein heat treatment is used for removing the rheological additive.

25. A method according to claim 24, wherein the heat treatment is carried out a at temperature of 140°C to 300°C, preferably 160°C to 240°C and more preferably 180°C to 220°C.

26. A method according to claim 24 or 25, wherein the heat treatment period is from 1 h to 36 h, preferably from 8 to 24 h and more preferably from 12 to 24 h.

27. A method according to claim 23, wherein solvent extraction is used, optionally supported by ultrasonic treatment.

28. A method according to claim 27, wherein the solvent extraction is carried out at a temperature of 20°C to 120.°C, preferably 50°C to 90°C and more preferably 60°C to 80°C.

29. A method according to claim 27 or 28, wherein the solvent extraction period is from 1 h to 36 h, preferably from 8 to 24 h and more preferably from 12 to 24 h.

30. A method according to one of claims 27 to 29, wherein the extracting solvent is selected from water, C_1-C_6 alcohols, C_3-C_8 ketones and any combination thereof.

31. A method according to claim 30, wherein the extracting solvent further comprises at least one emulsifier.

32. A method according to any of claims 27 to 31, wherein the green body obtained from step c) is further activated at a temperature from 90 °C to 240 °C, preferably from 90 °C to 220°C and more preferably 160 to 220°C.

33. A method according to claim 32, wherein the activation period is from 1 h to 8 h, preferably from 1 h to 6 h and more preferably from 1 h to 4 h.

34. Use of a shaped article as defined in any of claims 11 to 14 or prepared by a method as defined in any of claims 15 to 33 for drying, conditioning, purification and separation of gases, vapors and liquids, the loaded shaped article preferably being regenerated either by thermal treatment, by an alternating pressure process,

or by rinsing with water, any other solvent, extraction with any solvent and subsequent drying.

35. Use of a shaped article as defined in any of claims 11 to 14 or prepared by a method as defined in any of claims 15 to 33 in a non-regenerative operating procedure, in particular in the drying of the refrigerant in a closed circulation.

36. Use of a shaped article as defined in any of claims 11 to 14 or prepared by a method as defined in any of claims 15 to 33 in a non-regenerative operating procedure, in particular in the drying of packed products, including food, drugs, pharmaceuticals, diagnostics and cosmetics, more specifically as desiccants and moisture scavengers in drug bottles and containers, and boxes and cartridges to store and spend diagnostics, placed in or attached to the bottles, containers, boxes and cartridges, or being integrated part of them.

37. Use of a shaped article as defined in any of claims 11 to 14 or prepared by a method as defined in any of claims 15 to 33 for desulfurization of gases, in particular propellants for spray cans, preferably butane, wherein the sulfur-containing compound is preferably adsorbed by the shaped article.

38. Use of a shaped article as defined in any of claims 11 to 14 or prepared by a method as defined in any of claims 15 to 33 as a nitrogen adsorber in an air separation unit, in particular for generating oxygen-enriched respiratory air.

39. Use of a shaped article as defined in any of claims 11 to 14 or prepared by a method as defined in any of

claims 15 to 33 in combination with a methanol reformer as hydrogen purifier as useful for fuel cells.

40. Use according to claim 39, wherein the shaped article adsorbs the byproducts from the methanol reforming process such as CH_4, H_2O, CO, and CO_2.

41. Use according to claim 39 or 40, wherein said byproducts can be removed applying pressure/ vacuum swing adsorption, or less preferred by thermal treatment.

42. Use of a shaped article as defined in any of claims 11 to 14 or prepared by a method as defined in any of claims 15 to 33 in air-conditioning units as an adsorber/desorber, wherein the adsorption and evaporation enthalpies are utilized in particular for heating and cooling.

43. Use of a shaped article as defined in any of claims 11 to 14 or prepared by a method as defined in any of claims 15 to 33 in water-softening units which operate by the principle of calcium-sodium ion exchange, wherein the ion exchange takes place, in particular, in the shaped article.

44. Use of a removable rheological additive as a pore forming agent in the preparation of an adsorbing material comprising at least one porous functional solid incorporated in the polymer matrix containing at least one organic polymer or in the preparation of the shaped article comprising or consisting of said adsorbing material.

45. Use according to claim 44, wherein the evaporation and/ or decomposition temperature of the removable rheological additive is from 140°C to 300°C, preferably from

160°C to 240°C and more preferably from 180°C to 220°C, provided that the removable rheological additive is subjected to heat treatment at said evaporation and/or decomposition temperatures for a duration of at least 1h.

46. Use according to claim 44 or 45, wherein the removable rheological additive is selected from waxy components and/or oils.